

DETERMINING THE FEASIBILITY OF COMMERCIAL WINE GRAPE GROWING AND THEIR SURVIVABILITY RATE IN NORTHEASTERN WISCONSIN CLIMATE

Project Leader:

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County of Project Location: Door County

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PROJECT OBJECTIVES/INTENT:

- To provide research data on type of vines that will prove the economic feasibility of growing wine quality grapes, especially *vinifera*, in northeastern Wisconsin, specifically Door and Keweenaw County; and determine what the economic benefits are.
 - To determine what specific wine quality grapes, *vitis vinifera* and hybrids, can be commercially grown in Door County. Inherent in the objective is the climatological feasibility of growing wine quality grapes; especially *vinifera*.
 - To determine whether the growing of wine quality grapes is an economically viable alternative to cherries and other fruit/cash crops.
- **To create a new agricultural industry for Door County and Wisconsin and new opportunities for agricultural producers.**

SUMMARY OF ACCOMPLISHMENTS:

PLANTING:

Over the project period (July 2004 thru July 2005) and the previous 2 years over 23,000 vines were planted in 5 vineyards consisting of 34 acres. The following wine quality grape vines, procured from Double A Vineyards in Fredonia, New York, were planted:

<u>Hybrids</u>		<u>Vinifera</u>
Frontenac	Vignoles	Cabernet Franc
Foch	Golden Muscat	Pinot Noir
Dechaunac	Chardonel	Chardonnay
Cayuga White	Seyal Blanc	Johnnisburg Riesling
Espirit	Vidal Blanc	Gewrerztraminer
Vignoles	La Crosse	Pinot Gris
Traminette	NY 62	
Baco		

Double A Vineyards (phone: (717)672-8493, website: www.doubleavineyards.com) was selected as vine supplier because of its location in a somewhat similar climate. All of the vinifera vines were grafted with 3309 root stock variety. None of the hybrid vines were grafted. All vines were 2 year old or 1-X vines. All 23,000 vines were planted in late April, early May time frame. An additional 500 Frontenac and 100 Concord vines were planted in late May 2005. The purpose of this planting being to determine if this later planting had any effect on vine growth. In addition, the vineyard hosting this later planting was irrigated with a drip type irrigation system.

Vines were planted in rows with an exact north-south orientation. Rows were spaced 10 feet apart, thereby giving maximum sun exposure, with six feet between vines.

All vines over 2 years old were trellised with a two wire trellis system. The 12 gauge wires were placed at a height of 2 ½ feet and 5 ½ feet. 12 foot cedar posts sunk to a depth of 4 feet were used to post the trellis wires. Posts were placed at intervals of 4 plants each/24 feet. Vineyards were plowed and tilled prior to vine planting.

MAINTAINING:

After planting the vines were fertilized with liquid fertilizer, (Follett's Watch US Grow) (8-8-8) and when possible watered. As mentioned above, 500 Frontenac and 100 Concord were planted during the spring of 2005 in a vineyard equipped with a drip irrigation system. Other plants had to be watered by hand from a water trailer. Throughout the spring and summer 2004 growth was vigorous; many plants grew to the height of the top trellis wire (5 ½ feet). Throughout the growing season vines were trained by taping runners to the trellis wires. No major disease or pest condition was noted but precautionary spraying of Savin and Captan were applied in early June. Monthly fertilizer applications of Watch US Grow continued through July 2004.

No winter plant protection precautions were undertaken. In previous years, with older plantings, snow was plowed over vines. The snow plowing had a significant positive protection effect, especially on the vinifera vines.

TRAINING:

Vine pruning and trimming was undertaken in the first week of April 2005. Vine runners were pruned back to a point at which inner circle green growth (living) was noted. Generally for hybrids, vines were trimmed back to a remaining length of 24 inches from the main vine/trunk. Some cuttings were saved to see if they could be used for future propagation. Again, fertilizer was applied to the dormant plants.

The earliest plant “budding” occurred in mid-May. Again the hybrids were the first to bud. Frontenac, Foch and Espirit were the early budders. Budding continued thru mid-June. At mid-June we began to note that many of the early budding plants were struggling. They exhibited slow growth, a curling and fan shaping to the maturing leaves, and a drooping of the vine. We were to learn that these plants had been exposed to 2, 4-D spray from a neighboring farm.

The new vines planted in the irrigated vineyard flourished throughout the summer. Because of their once a week irrigation they quickly outgrew the previous year’s planting. These 500 Frontenac and 100 Concord plants all grew to the top trellis wire (5 ½ feet) many grew vines to a length of 12 feet.

GRAPE QUALITY:

In September 2004 and 2005 mature vines from previous plantings were evaluated for fruit quality. The following vines, planted in 2000 were evaluated:

Frontenac
Foch
La Crosse
Cayuga White
Espirit
Baco
Seyval

Grapes are ready to be harvested in the vine’s fourth or fifth year of growing. Even in this early state of growth the vines produced many thick clusters of medium to large grapes. In some cases the grapes were so thick that the vines had to be cluster thinned. Most vines had in excess of 20 clusters of grapes per vine; many had more than 30.

These grapes had high sugar levels* as follows:

	<u>DATE</u>			
GRAPE	8/20	8/29	9/03	9/13
Frontenac	15	19	20	24
Foch	17	18	20	25
De Chaunac	11	12	16	19
La Crosse	12	16	17	19
Espirit	15	17	19	20
Baco	15	17	20	21
Seyval	13	14	15	16

*Above expressed in BRIX or % of sugar

Winemaker, Tom Payette was pleased with the high sugar levels of the grapes. Of further note is the size and taste of the Espirit grapes; the fruit measures 18 to 20 millimeters in diameter and has a very pleasant fruity taste. Other varieties while not as large in size also featured a sweet fruity taste. The lack of size of some varieties are attributed to the severe lack of rainfall. Future construction of irrigations system should elevate this problem. These grapes will be harvested in late September and as in 2004 test wines will be produced.

In retrospect it would have been easier to start with a smaller project; plant fewer vines and evaluate success or failure. From data gathered expand planting of additional vines with a greater chance of survival.

ANALYSIS and CONCLUSIONS

Vine hardiness and survivability was evaluated over the 2005 spring and summer. The measure of effectiveness was the number/percentage of vines that survived over the winter period and continued growth thru the spring and summer. It needs to be noted that the 2004 – 2005 winter was not severe. The lowest temperature noted at the vineyard was - 5° F. As noted elsewhere no winter plant protection measures; mulching etc., were undertaken. Survival rates were:

<u>HYBRID</u>		<u>VINFERA</u>			
Frontenac:	96%	Vignoles:	92%	Cabernet Franc	8%
Foch	81%	Golden Muscat:	71%	Pinot Noir:	5%
DeChaunac:	89%	Seyual:	73%	Chardonnay:	5%
Cayuga White:	81%	Charnonnel:	54%	Riesling:	5%
Espirit:	91%	Vidal:	63%	Gewurztraminer:	6%
Vignoles:	89%	LaCrosse:	88%	Pinot Gris:	3%
Traminette:	71%	NY62:	77%		
Baco:	75%				

Our analysis indicates that it is feasible, from a climatic perspective, to grow and harvest hybrid wine quality grape varieties in Door County. It is not economically feasible or practical to grow vinifera type grapes in Door County.

OTHER SURVIVAL MATTER:

Disease and insects do not appear to be problems to growing wine quality grapes in Door County. Precautionary (2 times per growing season) applications of an herbicide/insecticide mixture to prevent disease and insect problems appear sufficient. However, deer and turkey pose a significant problem; deer eating the vines during the growing season and grapes during the harvest season; turkey eating the entire layer of low hanging fruit during harvest. At present without taking severe precautions, such as fencing, the deer, turkey and other critters forage 40% of the grape harvest. We have had limited success with deer repellent bags (pepper, and bone mixer) developed by Michigan State University.

MAJOR PROBLEM:

The most severe obstacle to growing wine quality grapes is the wide spread use of herbicide 2, 4-D. This dangerous chemical, the main ingredient of AGENT ORANGE, has a more detrimental effect on grape growing than all other impediments combined. In mid-June 2005 we noted that numerous vines were affected by an unknown enemy. A review of several texts, to include Michigan State University publications, revealed that the vines had symptoms of exposure to 2, 4-D. See Michigan State publication, "Questions About 2, 4-D and Grapes" @ www.msue.msu.edu/vanburen. Symptoms include: a fanning and upward cupping of vine leaves. Further investigation revealed that a neighboring farmer had applied 2,4-D to an adjacent field two weeks prior. Since the vines were in the bud stage and received a significant dose (the farm field is only 100 meters from the vineyard) over 50% of the vines were killed. Use of 2, 4-D needs to be banned in grape growing regions.

The havoc caused by 2, 4-D use is further described in the attached Michigan State University Extension publications. Additional information can also be gathered by contacting Mr. Ted Kearns, a Platteville, Wisconsin grape grower, who has experienced considerable problems with 2, 4-d. Mr. Kearns can be reached at (608)642-3330.

GRAPE QUALITY:

As previously stated grape quality is good. Fruit from earlier plantings in 2000 exhibited good tastes, high sugar levels and good yields. Ranked in order of quality, the following varieties are recommended for productions off wine.

<u>VARIETY</u>	<u>SUGAR CONTENT/BRIX</u>
1. Espirit	21
2. Frontenac	24
3. Foch	25
4. La Crosse	21
5. Seyval	16
6. Baco	21
7. De Chaunac	19

WINE QUALITY:

Small, test batches of wine from test fruit have been produced. These estate grown wines produce a nice tasting wine of good quality. Lab analysis indicates that these estate wines will be a quality comparable to most mid-range price wines presently on the market.

CONCLUSIONS:

1. Wine quality hybrid grapes can be grown and harvested in Northeastern Wisconsin; especially in the more temperate areas of Door County.
2. Vinifera varieties can not be grown in Northeastern Wisconsin.
3. Grapes can not be grown in areas where herbicide 2, 4-D is used.
4. Grapes are an economically viable crop.
Anticipated yields: 2 ½ to 3 ton/acre
Anticipated wholesale price: \$.50/lb
Anticipated revenues per acre: \$2,500 to \$3,000/acre
5. Concord grapes, generally not considered wine quality grapes but excellent juice grapes, grow well in Northeastern Wisconsin
6. There is little or no grape growing expertise in Wisconsin. For grape growing to be a successful endeavor technical assistance from the University and/or other educational and research institutions is required.

DESCRIPTION OF INFORMATION ON EDUCATIONAL MATERIALS

Even before project commencement it became apparent that no grape growing expertise exists in Wisconsin. Communications with the University Of Wisconsin Department Of Agriculture revealed that “there are no grape experts in the state” and that the University “has no interest”. However, the local University Extension office, Mr. Mark Fuerstein; and the University’s Peninsula Experiment Station, Mr. Richard Weidmen, were very helpful and assisted in providing information and advice.

In contrast, Minnesota and especially Michigan University systems have extensive grape growing programs. Michigan State University has produced a series of grape growing bulletins which were extremely helpful in planning and planting vineyards. These valuable educational bulletins which can be ordered on-line include:

- “Vineyard Establishment I – Preplant Decisions”
- “Vineyard Establishment II – Planting and Early Care”
- “Common Diseases of the Grapevine in Michigan”
- “Pest Control in Small Vineyards”
- “Pruning Grapes” – Video
- “Think Twice Before Using 2, 4-D”
- “Are Grapes Very Sensitive to 2, 4-D Injury”

In addition to their publications, the University’s Professor, Stan Howell, provided assistance through several phone calls.

New York’s Cornell University also has a very established grape growing program. Like Michigan State University they have several informative publications and research reports available through their online sites.

While the University of Wisconsin has little or no expertise in grape growing it is even more worrisome that the faculty has little or no interest in gaining expertise.

A valuable educational resource is the annual “Wineries Unlimited” seminar presented by Vineyard and Winery Management magazine. The seminars are normally held each March in Lancaster, Pennsylvania. Information can be found on-line at www.vwm-online.com. The magazine is also a valuable source of information. Our Winemaker, Tom Payette, is a contributor to the magazine.

FUTURE PLANS; NEED FOR ADDITIONAL RESEARCH AND DEVELOPMENT

Future plans include:

1. Replanting vines which were damaged or destroyed by cold weather; to include the replacement of vinifera plants with hardier hybrid varieties.
2. Continue monitoring and analyzing cold weather effects on hybrid varieties. Work with Double A Vineyards and other nurseries to develop and identify cold hardy varieties.
3. Continue to produce wine from estate grown grapes and, through lab analysis and blending, develop premium wines.
4. Work with local experts, such as Mark Fuerstien from the University Extension Office, to control the use of 2, 4-D in the vineyard locale.

RECOMMENDATIONS

1. Encourage wine quality grape growing in Northeast Wisconsin. Grapes are a good alternative to decline in other fruit, such as cherries, growing industry.
2. Develop grape growing expertise within the Wisconsin State University system. There is presently none in the state.
3. Ban the use of 2, 4-D in grape growing areas.

APPENDIX 1 – Discussion with Simon Creek Winemaker

Several winemaking points:

1. Are there any standards or criteria for what makes good wine grapes?

This varies from region to region and inside each region depending on a specific growing sight or plot of land. In the East we may have numbers on varieties that may not appear to be ripe "chemically" yet they are very ripe physiologically. Or we may have over-ripe conditions in other parts of the world. This is a big debate now. Ripeness is when the flavors in the berries/cluster are where one may want them to make a wine style that they desire. We are using our taste buds more now because we have not been able to apply a set of numbers that would be meaningful as a general rule. We can adjust many parameters by adding sugar, acid or other items to make up for what Mother Nature has shorted us.

The short answer is no - there is not a set of criteria for makes a good wine grape other than the ability to achieve the flavors inside that berry that one wants to accentuate into a wine.

2. What are some of the analytical #s we look for in good wine grapes? Sugar, acidity, etc.

Leads to the above. My best expression is this. Monitor the grapes in the vineyard and pick them just before they "breakdown and start to spoil or fall off the vine." This will achieve maximum ripeness in 95% of the cases as it may be rare that we would achieve an over-ripe status.

Chewing on the skins - to see what flavors are there as well as in the meat or pulp of the juice.

Look for brown seeds inside the berries Look for the rackis (top part of the stem of the cluster nearing the vine) for a sealing off from the vine; kind like an umbilical cord starting to shrivel up.

Analytics are different from whites to reds.

pH:

Whites. Higher acids lower pH's to preserve the color and slow the aging rate. I may like a Chardonnay at 3.35 at harvest - sometimes higher. And I have worked with Chardonnay that has come in at 4.20 pH. Things can vary.

Reds. Can have higher pH's and lower acids traditionally - yet this is also very variety sensitive as are the whites. Reds can come in at 3.6 pH or higher and much of this may depend upon the amount of malic acid in these berries, if we are looking to do a malo-lactic, and this may result in a large shift in the pH.

Sugar:

The sugar level is a direct reflection on the potential alcohol. Example a white grape pressed off to yield 23 brix will give a potential alcohol of 13.6 with most yeast. A red may yield 13.1 as those tend to loose more alcohol during production. We can always add sugar to achieve the alcohol desired - so no big issue here.

Acid:

Ranges across the board with variety, soils etc. We can alter this with additions and actually reductions use either potassium or calcium carbonate.

The main focus on growing fruit is that it has good varietal intensity for style and type of wine that you want to produce. It is free from excessive rot - yet it does not have to look like grocery store quality and that the fruit is balanced. The pH is in range with the acid. Not a high pH and a high acid. Now we are out of balance.

Hope the above makes sense and is helpful. It is kind of like a chef. It takes great flavorful raw materials to make a great flavored dish and these can be grown regionally. We can't do much to add the flavors beyond some salt and pepper etc. It needs to be in the fruit.